sure increases from the diastolic to close to the systolic level. And it was shown that under approximately this set of conditions such is actually the case (see Figs. 10 and 11).

But even if Boyle's law did (and it actually does not) determine a diminution instead of an increase in the amplitude of oscillations with increasing compressing pressure, the development of the theory of compression oscillations would not have been affected in the least. For in the further development of the theory it is shown (Figs. 12 and 13) that under the influence of additional conditions obtaining in sphygmomanometry the consequences of Boyle's law become relatively so insignificant that the amplitude of oscillations, instead of increasing, as the compressing pressure rises from the diastolic to the systolic level, actually decreases.

JOSEPH ERLANGER
WASHINGTON UNIVERSITY MEDICAL SCHOOL,
ST. LOUIS, MO.

THE UNIT OF PRESSURE

TO THE EDITOR OF SCIENCE: The announcement that the French Meteorological Service has, beginning January 1, 1917, decided to publish atmospheric pressure data in units of force instead of millimeters as heretofore, makes it necessary once more to call attention to the fact that the proper unit for the expression of pressure is not the *millibar* but the *kilobar*. The scientific reasons for this have been given elsewhere at length. Another valid reason, however, may be now mentioned.

There has recently been developed a new type of condensation high-vacuum pump. I refer to that of Professor Langmuir. Pressures as low as 10^{-5} bar have been obtained; and there is little doubt that very much lower pressures can be produced by cooling the bulb to be exhausted, in liquid air, so as to decrease the rate at which gases escape from the walls.

The unit *bar* is here used (and I believe this is the practise of the General Electric Company and will of course be followed by physicists, chemists and others working on allied problems) in its right sense, namely, the accelerating force of one dyne per square centimeter. This is 10^{-6} megabar. In the case of this type of pump we have a pressure of 10^{-11} megabar or 10^{-11} standard atmosphere.

The millibar then in daily use becomes what it properly is, 10^{-3} bar. The European Weather Services trying to express atmospheric pressures in millibars are in error, and the correct values are one million times greater.

Fortunately, it is an easy matter to change *mb* to *kb*. And this should be done on all tables, charts, etc., published by European meteorologists.

ALEXANDER MCADIE

A RELIEF MAP OF THE UNITED STATES

TO THE EDITOR OF SCIENCE: With reference to the suggestion in SCIENCE of March 9, relative to a large relief map of the United States, may I be allowed to state that this is a matter which I often discussed with the late E. E. Howell, who at one time had it under serious consideration? It was then my view, to which I still adhere, that there was a limit in size for such objects, beyond which nothing was gained. This was particularly impressed upon me some years ago while studying some of the maps of celebrated battlefields in German museums. In these large models, details toward the center, on account of distance from the eye, were as inconspicuous as though on a smaller scale and closer at hand. In short, the effect of the enlarged map was wholly lost owing to the necessary distance of the observer. A small map near at hand would be much less expensive, and fully as satisfactory.

With Dr. Clarke's remarks in SCIENCE for March 23 I fully agree, data not being at hand for anything but the most general topographic features over a large portion of the area of the United States. The plan, as it appears to me, is wholly impracticable.

GEORGE P. MERRILL
U. S. NATIONAL MUSEUM,
WASHINGTON, D. C.

QUOTATIONS

RESEARCH IN MEDICAL SCHOOLS

AN important report[1] in this issue of *The Journal* shows that of the twenty-six founda-

[1] "Medical Research in Its Relation to Medical Schools." A Report by Drs. Frederic S. Lee, Richard M. Pearce and W. B. Cannon, composing

tions for medical research in this country, seventeen, or nearly two thirds, are in connection with medical schools. The report also intimates that the "great growth of the spirit of research in this country" accompanied "the phenomenal development which medicine has undergone in recent years." In fact, the growth of medical research has been in direct proportion to the increase in the number of full-time, salaried professors in medical schools. This increase has been influenced, to a certain extent at least, by the inclusion of the possession of full-time teachers and the conduct of resarch work as one of the ten requisites in the basis[2] on which the Council on Medical Education rated medical schools in its first published classification. Since full-time teachers were urged chiefly in the laboratory branches, the development of research has been most rapid in that division of the medical school. Only a few medical colleges were amply financed to provide full-time professors in clinical departments and, therefore, only a few have all departments, laboratory and clinical, carrying on active research. With larger numbers of full-time clinical professors medical research in medical schools will attain to a higher degree of efficiency than is possible where that research is in isolated laboratory departments. There can not fail to be better results where all departments of the medical school are interested and cooperating in research, since then any department has the advantage of all the resources of the medical school; any discovery may be tried out under adequate facilities and safeguards and its value established or disproved. In fact, a modern medical school, with its skilled faculty; with its laboratories thoroughly equipped for medical instruction and research, and with an abundance and variety of clinical material at its command, constitutes the ideal arrangement for medical research. On the other hand, the medical school can not reach its highest efficiency in teaching unless it is permeated by the spirit of investigation that is engendered by research. The student can not fail to be benefited. He appreciates better the importance of the fundamental medical branches; that the training in the medical school merely admits him to the field of medicine with its limitless possibilities for usefulness, and that his future success depends on investigation, on keen observation, on accuracy of judgment, and on the skill with which he applies his knowledge. Graduates of medical schools in which research is a prominent feature of the work will be better able than those of other schools to cope with the multiform problems which confront the modern practitioner of medicine.—*Journal of the American Medical Association.*

the Committee on Medical Research of the Association of American Medical Colleges, read at the Annual Meeting in Chicago, February 6, 1917.

2 "Essentials of an Acceptable Medical College." Report of the Council on Medical Education to the House of Delegates of the American Medical Association, June 6, 1910, *The Journal of the American Medical Association,* June 11, 1910, p. 1975, paragraph 12 and p. 1976, paragraph 8.

SCIENTIFIC BOOKS

Metamorphic Geology. By C. K. Leith and W. J. Mead. Henry Holt & Co., New York. 1915.

Metamorphism as defined by the authors embraces "all mineralogic, chemical and physical changes in rocks subsequent to their primary crystallization from magma." That is, it includes all changes produced by weathering, disintegration, decomposition and deposition by sedimentation or from solution, as well as those processes that solidify by crystallization and rearrangement, and thereby form crystalline schists. In this sense all rocks except unaltered igneous rocks are metamorphic rocks, namely, soils, sedimentary strata, and crystalline schists. While a comprehensive treatment of all manner of alterations which may take place in rock masses is the logical and satisfactory method, it would seem advisable to employ some other term for the whole process than metamorphism, which has acquired through long usage a more restricted application.

Naturally the subject is separated into two parts, that of the destructive alterations, and that of constructive ones, which, following